

Panel Discussion Notes

The following notes were taken during the individual panel discussions.

Panel 2 Storage and Cleanup Issues

Chairperson Matt Small, U.S. Environmental Protection Agency
 Members Bob Wilkenfeld, Chevron Research and Technology Company
 James Davidson, Alpine Environmental
 Chuck Headlee, San Francisco Regional Water Quality Control Board
 Tim Buscheck, Chevron Research and Technology Company
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Sheet 1

Outline:

1. *Incentives*
2. Dis-incentives
3. How will storage change?
4. How will site characterization change?
5. How will cleanup change?
6. Research/Information needs?

Sheet 2

Storage Issues	Effects of Adding Ethanol & Alkylate
Operation & Maintenance Human and Mechanical	Same Before and After
Leak Detection Conditions?	Same Before and After
Vapor Permeability (Issues w/ increased RVP and MTBE vapor recovery systems)	Same Before and After
UST System Compatibility with Ethanol	?
Corrosion Tank Bottom Waste Bio-fouling	Worse

Sheet 3

1. Probability of Release? Depends heavily on the probability of proper installation/maintenance?
 2. Will Ethanol (EtOH) RVP increases also increase MtBE vapor releases? (Outside CA)
 3. Will Ethanol increase corrosion problems?
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Sheet 4

1. Worse Case Release Doubles Plume Length?
 2. Double BTEX Plumes?
 3. Double Existing MtBE Plumes?
 4. Pollution Prevention Pays
 5. Mix EtOH w/Gas at Refinery?
 6. May change how we investigate for MNA (revised geochemical foot prints)
 7. Increased Need for Field Data.
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Sheet 5

1. Product integrity.
 2. Storage System Safety.
 3. Chevron AST System Improvements;
 4. Double bottoms, lining
 5. Changing behaviors of tank managers/operators
 6. UST Improvements: EtOH, compatible, tank/line/containment monitoring w/annual certification. Positive pump shutoff, dispenser containment, caulk slab, submersible containment
 7. Coming Soon: liquid filled interstice, drainless spill buckets, swivel fill connectors, vapor recovery containment.
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Sheet 6

1. Cleanup may be limited by our ability to address electron acceptor deficiency.
 - Nitrate addition? (Hemoglobin health risk?)
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Sheet 7

TANK SYSTEM IMPROVEMENTS for EtOH; Alkylates

1. EtOH material compatibility (especially Southern CA older tanks) Fiberglass pre 1984?
2. Permeability of system components.
3. RVP increase w/MtBE vapor release?
4. Corrosion Issues
5. Wet tanks/water in tank may concentrate EtOH in H₂O and increase corrosion.
 - Existing single walled systems are at greatest risk

Sheet 8

1. Double-walled systems need improved testing/confirmation of integrity
2. Installation inspections for new systems.
3. No extra changes needed for Alkylates outside of general improvements
4. Changed behaviors
 - Training
 - Periodic observation/re-training of operators
 - Near miss investigations
5. Tax incentives?
 - Lower tax for less releases
 - Tax gas before delivery

Sheet 9

6. Non-majors may need more incentives/behavior modification
7. *More date on where and how systems fail*
8. Carrot incentive: Green environmental compliance seal (didn't work well in Ohio).
9. Stick (disincentive): tank tag program (Could be easier to apply fairly)
10. Letter grades for compliance similar to restaurants (incentive).

Sheet 10

Site Assessment/Characterization

1. New EtOH releases may consume electron acceptors, reducing biodegradation of other contaminants and potentially lengthening plumes.
2. May have to investigate further down gradient
3. We are already under-investigated, under sampled
4. If EtOH makes plumes longer/more mobile, we need better investigation, higher sampling density (follow MtBE type plume characterization approaches)
5. Plume diving? (May be more of an issue for longer plumes)

Sheet 11

Release Scenarios

1. New Release w/ EtOH
2. EtOH release w/ existing Hydrocarbon
3. EtOH w/ existing MtBE
4. Neat EtOH release
5. New Alkylate release

Sheet 12

1. Follow existing natural attenuation protocols for establishing geochemical footprints for EtOH.
2. Consider the following additions to the protocols (research needed on these items):
3. *Acetate*
4. *Acetone???*
5. *Humic acid mobilization*
6. *Butyrates*
7. Methane
8. *Reliable EtOH detection methods (Not just detection limits)*
9. May be explosion hazard with methane buildups

Sheet 13

1. Can we look for EtOH?? If we don't find it does it prove it wasn't there? (Cost = \$10.00 analysis + consultant time).
2. *Controlled release for various scenarios*
3. Should we just manage the BTEX regardless of whether the plume is longer or not?
4. What are the cleanup limits in H₂O?? What are the risks?
5. *Can isotopic signatures tell you that EtOH was here and gone?*
6. Hard to distinguish EtOH biodegradation signature from biodegradation signature of BTEX.
7. Converging lines of evidence methane, acetate, etc. to tell that EtOH was here and gone??

*Sheet 14***CLEANUP**

1. Alkylates may increase focus on source mass removal, but won't change much else.
2. Maintain D.O. levels as cheaply as possible?
 - Elevated D.O. as part of remedial goal?
 - D.O. = electron acceptors in general
3. Even after EtOH our treatment systems will be for MtBE (maybe some small number of BTEX sites)
4. Active remediation for MtBE sites and MNA for no MtBE?
5. Analysis for EtOH, at levels guided by risk, and ensure that we are testing for a release not incidental EtOH from other bioactivity (> PPB levels)

Sheet 15

Step 1?	Step 2?
<ul style="list-style-type: none"> • Test EtOH • Look for suite of geochemical indicators • <i>Can we confirm that the footprint is EtOH - not just BTEX</i> 	<ul style="list-style-type: none"> • Just measure BTEX/MtBE plumes no matter how they behave
Is Step 1 Needed?	

Sheet 16

1. Ecotoxicity issues and surface water issues for tanker spills and treatment system discharge. D.O. consumption, not much you can do - let it dilute.
2. Fouling of treatment systems due to increased bio-activity?
3. *EtOH at marinas in reservoirs. Sulphate reduction/ordors*
4. Most future releases will be drips and drabs. May be more BTEX issues for the rare future large releases.
5. For the few neat releases, we will need more intensive action (BTEX, methane, etc.)
6. *Research on ethanol release imposed on existing MtBE release.*

Sheet 17

Where do We Spend \$\$?

1. MtBE remediation (still the big cleanup issue).
2. Impact of EtOH on existing MtBE releases
3. Upgrade single wall to double-wall and tank system design
4. Training education
 - Operators (front-line people)
 - Jobbers
 - Owners
 - Inspectors
 - Regulators
5. EtOH risks human/ecotoxicity/etc.
6. *Controlled release experiments*
7. Adjust models used to set cleanup levels, RBCA etc.

Panel 2 - Summary Notes

The following notes were taken during the panel discussion groups' report to the large group about lessons learned.

Panel 2 Research Needs

1. MtBE remediation
2. Impacts of EtOH on existing MtBE release
3. EtOH risks and cleanup goals
4. Controlled release
 - EtOH*
 - EtOH* over existing MtBE
 - EtOH* over existing Hydrocarbons
 - *Gasahol & Neat
5. Geochemical Indicators for EtOH
 - Acetate? Acetane? Humic Acid? Butyrates
 - Isotopic signatures?
6. Reliable EtOH detection methods
 - Not just detection limits
7. Statistical analysis of field data to examine effects of EtOH on plume analysis and dimensions
 - How and why releases occur from Underground Storage Tanks and Above Ground Storage Tanks (How systems fail)
6. EtOH at marinas/reservoirs
8. Ecotoxicity
9. Sulfate reduction
10. EtOH/MtBE mix increased RVP and potential for increased vapor releases.
11. Policies: RBCA, MNA, Cleanup Goals, Sampling, Requirements, etc. Performance vs. Prescriptive standards
12. Procedures:
13. Guidance